Towards a Scenario Based Project Management Paradigm

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Introduction

✦ Several software projects still use more resources than planned, take more time to be concluded, and provide less functionality and quality than expected

✦ Two philosophical paradigms analyze such problems
  ➔ The technological paradigm
  ➔ The managerial paradigm
Introduction

- Current management techniques have some assumptions
  - Project behavior must be known from the beginning

- Complex projects break these assumptions
  - Need for innovative domains and domain integration
  - Ambiguity and complexity
  - Diseconomy of scale
  - Nonlinearities
  - Complex feedback loops

Modeling & Simulation

- Techniques that help to understand complex systems
  - Software development is a complex system

- System Dynamics
  - Modeling technique and language
  - Focus on structural aspects of the systems
  - Systems are described in mathematical formulations
  - Model cause-and-effect relationships
  - Model feedback loops
Thesis Proposal

- Apply SD modeling for operational project management
  - Some project models have already been developed
  - Abdel-Hamid and Madnick’s model
  - Extensions from Madachy, Tvedt, among others

- Proposed enhancements
  - Uncertainty representation
  - High-level project representation
  - Capturing differences among elements of the same category
  - Separation of facts from policies

Scenario Based Project Management

- A paradigm for project management
  - A manager defines an expected behavior for a project
  - This behavior can be affected by unexpected events
  - Project sensibility to combinations of such events is tested
  - Simulation helps the evaluation of project behavior

- SBPM is supported by
  - Risk management
  - Project modeling
  - Continuous-time simulation
SBPM Artifacts

- The project model
  - Defines project expected behavior
  - Based on descriptive process models
  - Can be translated to a system dynamics model

- Scenario models
  - Alternative routes to the project
  - Generic, recurrent, and reusable
  - Integrated to project models
  - Abstract models

Example - Project Model

```
TABLE COMMOVH 0, 0.015, 0.06, 0.135, 0.24, 0.375, 0.54;
RATE (SOURCE, <ACT:Duration>) COMMRATE
VAR<ACT:Duration> *
LOOKUP (COMMOVH, <ACT:RolesCount>, 0, 30);
```
Example - Project Behavior

Risk Management

- We define a risk management process
  - Risks faced by a project are represented as scenarios
  - Documenting risks through scenarios
  - Reusing scenarios along several projects
  - Simulating scenario combinations for risk evaluation

- Risk information
  - Risk archetypes conveys information about a software risk
  - Scenarios for risk impact evaluation and resolution strategies
### Research Methodology

<table>
<thead>
<tr>
<th>Year</th>
<th>Task</th>
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</thead>
<tbody>
<tr>
<td>99/00</td>
<td>Risk Literature Review</td>
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<tr>
<td>99/00</td>
<td>SD Language</td>
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<td>Uncertainty Representation</td>
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<td></td>
<td>SD Simulator</td>
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<td>Dez/00 2001</td>
<td>Meta model Definition</td>
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<td>Risk Archetype Definition</td>
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<td>2001</td>
<td>Integration API</td>
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<tr>
<td></td>
<td>Scenario Examples</td>
</tr>
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<td>Major Validation</td>
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### Expected Contributions

- A high-level project model description that can be translated to system dynamics
- The integration of such project model to separate scenario models, with an integration API
- A risk management process that uses models to evaluate the impact of software project risks and their resolution strategies
Questions?

A product related to the Odyssey Project (COPPE/UFRJ)

http://www.cos.ufrj.br/~odyssey

Come to our tool presentation!!

TRANSPARÊNCIAS COMPLEMENTARES
Proposal Application - Types of Project

- COCOMO I classification of software projects

<table>
<thead>
<tr>
<th>Feature</th>
<th>Organic</th>
<th>Semidetached</th>
<th>Embedded</th>
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</thead>
<tbody>
<tr>
<td>Organizational understanding of product objectives</td>
<td>Through</td>
<td>Considerable</td>
<td>General</td>
</tr>
<tr>
<td>Experience in working with related software systems</td>
<td>Extensive</td>
<td>Considerable</td>
<td>Moderate</td>
</tr>
<tr>
<td>Need for software conformance with pre-established requirements</td>
<td>Basic</td>
<td>Considerable</td>
<td>Full</td>
</tr>
<tr>
<td>Need for software conformance with external interface specifications</td>
<td>Basic</td>
<td>Considerable</td>
<td>Full</td>
</tr>
<tr>
<td>Need for innovative processing architectures and algorithms</td>
<td>Minimal</td>
<td>Some</td>
<td>Considerable</td>
</tr>
<tr>
<td>Premium for early completion</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>

Proposal Application - Types of Project

- Adding size dimension to the classification schema

<table>
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<th>Size</th>
<th>Organic</th>
<th>Semidetached</th>
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<tbody>
<tr>
<td>Small</td>
<td>Very Low Risk</td>
<td>Low Risk</td>
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<td>Medium</td>
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<tr>
<td>Large</td>
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